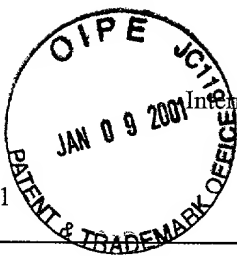


U.S. Application No.  
09/554,288

Date: January 4, 2001



International Application No.  
PCT/EP98/07185

JC03 Rec'd PCT/PTO

09 JAN 2001

Attorney Docket No.  
KKFI40.001APC

Page 1

**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 USC 371**

**09/554288**

International Application No.: PCT/EP98/07185  
International Filing Date: November 11, 1998  
Priority Date Claimed: November 11, 1997  
Title of Invention: METHOD AND APPARATUS FOR CONTINUOUS METERING  
Applicant(s) for DO/EO/US: Hans Wilhelm Häfner

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- (X) This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
- (X) Copy of Notification of Missing Requirements Under 35 U.S.C. 371 In The United States Designated/Elected Office (DO/EO/US) dated December 4, 2000.
- (X) An oath or declaration of the inventor (35 USC 371(c)(4)).
- (X) A copy of the International Search Report.
- (X) A return prepaid postcard.
- (X) The fee of \$130 for submission of the Declaration after 30 months from the priority under 37 C.F.R. 1.492(e).
- (X) A check in the amount of \$130 to cover the above fees is enclosed.
- (X) The Commissioner is hereby authorized to charge only those additional fees which may be required, now or in the future, to avoid abandonment of the application, or credit any overpayment to Deposit Account No. 11-1410. A duplicate copy of this sheet is enclosed.


01/11/2001 MNGUYEN 00000091 09554288

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130.00 OP

SEND ALL CORRESPONDENCE TO:

KNOBBE, MARTENS, OLSON & BEAR, LLP  
620 Newport Center Drive  
Sixteenth Floor  
Newport Beach, CA 92660

  
Signature

Andrew H. Simpson  
Printed Name

31,469  
Registration Number

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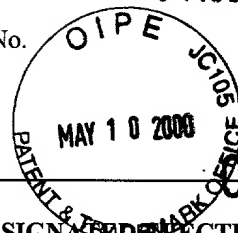
U.S. Application No.  
Unknown

International Application No.  
PCT/EP98/07185

Attorney Docket No.  
KKFI40.001APC

Date: May 10, 2000

Page 1



**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 USC 371**

International Application No.: PCT/EP98/07185  
International Filing Date: November 11, 1998  
Priority Date Claimed: November 11, 1997  
Title of Invention: METHOD AND APPARATUS FOR CONTINUOUS METERING  
Applicant(s) for DO/EO/US: Hans Wilhelm Häfner

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. ☒ This express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 USC 371(c)(2))
  - a) ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b) ☒ has been transmitted by the International Bureau.
  - c) ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 USC 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3))
  - a) ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b) ☐ have been transmitted by the International Bureau.
  - c) ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d) ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 USC 371(c)(4)).
10. ☐ A copy of the International Preliminary Examination Report with any annexes thereto, such as any amendments made under PCT Article 34.
11. ☐ A translation of the annexes, such as any amendments made under PCT Article 34, to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

U.S. Application No.  
Unknown

International Application No.  
PCT/EP98/07185

Attorney Docket No.  
KKFI40.001APC

Date: May 10, 2000

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**Items 11. to 16. below concern other document(s) or information included:**

12. ( ) An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
13. ( ) An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
14. (X) A FIRST preliminary amendment.  
( ) A SECOND or SUBSEQUENT preliminary amendment.
15. ( ) A substitute specification.
16. ( ) A power of attorney and/or address letter.
17. (X) International Application as published.
18. ( ) Small Entity Statement.
19. ( ) PCT Form PCT/IPEA/402.
20. ( ) PCT Form PCT/IB/308.
21. ( ) PCT request form.
22. (X) A return prepaid postcard.
23. (X) The following fees are submitted:

U.S. Application No.  
Unknown

International Application No.  
PCT/EP98/07185

Attorney Docket No.  
09/554288  
KKFI40.001APC

Date: May 10, 2000

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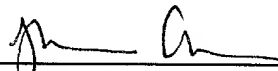
				FEES
BASIC FEE				\$840
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	9 - 20 =	0 ×	\$18	\$0
Independent Claims	2 - 3 =	0 ×	\$78	\$0
Multiple dependent claims(s) (if applicable)			\$260	\$0
TOTAL OF ABOVE CALCULATIONS				\$840
Reduction by 1/2 for filing by small entity (if applicable). Verified Small Entity statement must also be filed. (NOTE 37 CFR 1.9, 1.27, 1.28)				\$0
TOTAL NATIONAL FEE				\$840
TOTAL FEES ENCLOSED				\$840
amount to be refunded:				\$0
amount to be charged:				\$0

24. (X) The fee for later submission of the signed oath or declaration set forth in 37 CFR 1.492(e) will be paid upon submission of the declaration.
25. (X) A check in the amount of \$840 to cover the above fees is enclosed.
26. ( ) Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40 per property.
27. (X) The Commissioner is hereby authorized to charge only those additional fees which may be required, now or in the future, to avoid abandonment of the application, or credit any overpayment to Deposit Account No. 11-1410. A duplicate copy of this sheet is enclosed.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Signature

Thomas R. Arno  
Printed Name

40,490  
Registration Number

KKFI40.001APC

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Hans Wilhelm Häfner	)	Group Art Unit Unknown
			)	
Appl. No.	:	Unknown	)	
			)	
Filed	:	Herewith	)	
			)	
For	:	METHOD AND APPARATUS	)	
		FOR CONTINUOUS	)	
		METERING	)	
			)	
Examiner	:	Unknown	)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Prior to examination of the above-captioned application, please amend the application as follows:

IN THE SPECIFICATION:

Please amend the specification as follows:

On page 1, between the title and the first paragraph, please insert --Field of the Invention--.

On page 1, between the first and second paragraphs, please insert --Background of the Invention--.

On page 2, between line 1 and line 2, please insert --Summary of the Invention--.

On page 2, lines 5 and 6, please replace this paragraph with --An aspect of the invention involves a method of continuous metering bulk material from a container with a rotary-vane feeder and a metering device following the rotary-vane feeder. A feed rate for the rotary vane is set, and a discharge rate of the metering device is adjusted to a value that is lower than the feed rate of the preceding rotary-vane feeder, so that return feed from the rotary-vane feeder to the container takes place.

Appl. No. : Unknown  
Filed : Herewith

Another aspect of the invention involves an apparatus for continuous metering of bulk material from a container. The apparatus includes a rotary-vane feeder, a metering device configured to receive material from the rotary-vane feeder, and a metering controller coupled to the rotary-vane feeder and the metering device, wherein mass flow at the rotary-vane feeder is greater than a discharge rate of the metering device for partial return feed of the bulk material to the container.--

On page 2, line 13, please delete this sentence.

On page 2, between lines 13 and 14, please insert --Brief Description of the Drawings--.

On page 2, between lines 19 and 20, please insert --Detailed Description of the Invention--

On page 5, line 1, please replace "CLAIMS" with --WHAT IS CLAIMED IS:--

IN THE CLAIMS:

Please cancel Claims 1-9 without prejudice.

Please add the following new Claims:

10. A method of continuous metering of bulk material from a container with a rotary-vane feeder and a metering device following the rotary-vane feeder, comprising:

setting a feed rate for the rotary vane; and

adjusting a discharge rate of the metering device to a value that is lower than the feed rate of the preceding rotary-vane feeder, so that return feed from the rotary-vane feeder to the container takes place.

11. The method of Claim 10, wherein said adjusting takes into account a filling state of an intermediate container between the rotary-vane feeder and the metering device.

12. The method of Claim 10, further comprising altering a speed of rotation of the metering device to regulate discharge of the metering device.

13. The method of Claim 10, further comprising using is a pneumatic feed, and altering at least one of an air amount and an air speed to regulate discharge of the metering device.

14. An apparatus for continuous metering of bulk material from a container, comprising:

a rotary-vane feeder;

a metering device configured to receive material from the rotary-vane feeder; and

a metering controller coupled to the rotary-vane feeder and the metering device, wherein mass flow at the rotary-vane feeder is greater than a discharge rate of the metering device for partial return feed of the bulk material to the container.

Appl. No. : Unknown  
Filed : Herewith

15. The apparatus of Claim 14, wherein the metering device is formed as a rotary-vane feeder.

16. The apparatus of Claim 14, wherein the metering device is formed as a metering rotor scale.

17. The apparatus of Claim 14, wherein the metering device is formed as a horizontal lock.

18. The Apparatus of Claim 14, wherein return feed cells of the rotary-vane feeder are filled to level of about 20-40%.

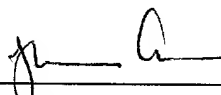
REMARKS

The foregoing amendments are to more closely conform the application to U.S. practice. No new matter is added. Entry of the amendments is respectfully requested.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 5/10/00

By:   
Thomas R. Arno  
Registration No. 40,490  
Attorney of Record  
620 Newport Center Drive  
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Newport Beach, CA 92660  
(949) 760-0404

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1/p ART

09/554288

Description

422 Rec'd PCT/PTO 10 MAY 2000

### Method and apparatus for continuous metering

This invention relates to a method and an apparatus for continuous metering of bulk material from a container, with a rotary-vane feeder and a metering device following the rotary-vane feeder.

Such a system for continuous feed of bulk material is known from DE 40 23 948 A1, wherein a metering rotor scale according to DE 32 17 406 A1 or EP-A 0 198 956 is employed. This metering device following a bulk material feeder is connected downstream in a closed pneumatic conveyor path of a collecting device with a rotary-vane feeder. The bulk material mass contained therein can accordingly be determined continuously and influence either the speed of rotation of the rotary-vane feeder or the total air-flow amount of the feed blower, so that the bulk material throughput can be influenced by varying the amount of air supplied per unit time.

To effect the appropriate regulation of the desired mixing ratio or the desired feed amount per unit time (feed rate) a computer-controlled, central metering control system is employed, such as is described in DE 32 17 406 A1 for example, wherein a weigh signal of the bin scale cells of the collecting device serves as an input signal and the speed of rotation of the metering rotor and if desired of the rotary-vane feeder for the bulk material feed is regulated.

This regulating system is also described in more detail in EP-A 0 198 956 cited above, wherein the bulk material mass acting instantaneously in the metering rotor scale is detected, from which the bulk material mass throughput results through multiplication by the angular velocity of the metering rotor. The weighing electronics store the instantaneous bulk material mass present on the rotor weighing path (measuring path), so that the rotor angular velocity can be varied shortly before the discharge of the bulk material into the pneumatic conveyor line, in accordance with the predetermined set-point feed rate. A relatively high metering accuracy results from this, which is very well suited to metering powdered bulk material, for example in coal dust metering for cement rotary kilns or for metering gypsum or additives in flue gas purification.

However it has to be recognised that, with certain conveyed materials, these bulk materials can tend to form bridges, depending on the degree of moisture, fluidisation, fineness, etc., so that random or strongly pulsating fluctuations in the mass flow can occur in the bulk material discharge. These short-term mass flow fluctuations can be partially compensated by increased feed pressure, in particular even with large conveyor paths. However a greater leakage airstream to the container then occurs, which can lead to disturbances in the bulk material feed and the feed rate. To some extent



so that the expense of construction is increased substantially.

Accordingly the invention is based on the object of providing a method and an apparatus for continuous metering of bulk material with which an improved tightness and large conveying capacity are obtained in a simple way.

This object is met by a method according to the features of claim 1 and by an apparatus according to the features of claim 5.

By regulating the following metering device relative to the feed rate of the preceding rotary-vane feeder or vice versa, an improved self-sealing results from the partial return feed in the rotary-vane feeder, through the bulk material elevated in the returning cells, and accordingly a substantial reduction in the leakage gas flow into the metering system, so that a high metering or conveying capacity is achieved. This is especially important for coal dust metering with large feed lengths and feed pressures.

Preferred embodiments are the subject matter of the dependent claims.

Two embodiments will be described and explained in more detail below with reference to the drawings, in which:

Fig. 1 is a longitudinal sectional view through an apparatus for continuous bulk material metering with two rotary-vane feeders; and

Fig. 2 shows a modified embodiment of the apparatus according to Fig. 1, wherein a metering rotor scale is used for the metering.

An apparatus 1 for continuous metering is shown in Fig. 1, wherein the feed material to be metered in accordance with and adjustable set-point value, especially a pourable bulk material, is fed out of a silo or container 2 by means of a discharge device 3 in the form of a rotary-vane feeder 4. The feed material passes into the rotary-vane feeder 4 and then into an intermediate container 5. The rotary-vane feeder 4 is preferably formed as a sealed lock, which feeds bulk material out of the intermediate container 5 constantly filled with bulk material back up again and into the returning cells 7 here on the right back to the container 2, as is shown in dots. The rotary-vane feeder 4 is driven by an electric motor 6, which is connected to a metering controller 10 for adjustment of the speed of rotation. The speed of rotation of the star wheel of the rotary-vane feeder 4 required for the "excess feed" is always (with otherwise equal dimensions) slightly higher than the speed of rotation of the lower rotary-vane feeder, which serves as a metering device.

However, in order to determine the mass flow of the rotary-vane feeder 4 the speed of rotation can also be derived directly from the drive shaft or the power taken by the drive motor 6. The rotary-vane feeder 4 shown here with a horizontal axis has the advantage of a relatively high

feeders with vertical axes can also be used.

A metering device 8, again in the form of a rotary-vane feeder, is provided at the lower end of the intermediate container 5, this device being driven by a motor 8a with a regulated speed of rotation and a blow-out line 9 opening into it. It is essential that the measured value sensor of the rotary-vane feeder 4, i.e. a speed of rotation transducer or tacho-generator for example on the motor 6, is connected to the metering controller 10, which thus determines the instantaneous mass flow of the rotary-vane feeder 4 and relates it to the feed rate of the metering device 8, in order to adjust or vary its speed of rotation or angular velocity in accordance with the feed rate of the rotary-vane feeder 4, in the sense of an excess feed. Accordingly, if there is a deviation of the mass flow at the rotary-vane feeder 4, the angular velocity of the metering device 8 is reduced by the corresponding value or the speed of rotation of the rotary-vane feeder 4 is increased, in order to keep the fill height constant in the intermediate container 5.

It is of essential importance that the bulk material is skimmed off to the container 2 by the rotary-vane feeder 4 on account of the constant filling of the intermediate container 5, so that the at least partially filled, return feed cells 7 substantially increase the tightness against leakage gas flows. Thus, it can be computed by the metering controller 10 what feed rate or speed of rotation of the rotary-vane feeder 4 is necessary to maintain the filling height and thus the return feed of about 30% of the bulk material. Depending on the angular velocity of the metering device 8 which is also measured (e.g. a tacho-generator on the motor 8a) the appropriate feed rate of the rotary-vane feeder 4 arranged above the metering device 8 can be adjusted or regulated, taking into account the filling height below the rotary-vane feeder 4. The metering controller 10 can thus regulate the speed of rotation of the rotary-vane feeder 4 at all times taking into account the discharge rate of the metering device 8, so that a continuous, deliberate return feed to the container 2 is possible through the upwardly running, return feed cells 7 here on the right, and with this an improved tightness of the rotary-vane feeder 4 against leakage gas losses.

A modified embodiment of the apparatus 1 according to Fig. 1 is shown in Fig. 2, wherein a metering rotor scale 8' (especially according to the state of the art recited in the introduction), with a blow-out line 9 and a weighing cell 11, is arranged below the rotary-vane feeder 4 as a metering device 8. It should be noted that a horizontal lock (with a vertical axis) similar to the metering rotor 8' in Fig. 2 can be used instead of the lower rotary-vane feeder shown in Fig. 1. In an advantageous design, in order to keep the filling height constant below the rotary-vane feeder 4 its mass flow can be controlled or regulated to about 120 - 130% of the metering device 8, so that a return feed proportion of 20 - 30% into the rotary-vane feeder 4 occurs. In a particularly simple design it is

in order to achieve synchronous regulation of the upper and lower rotary-vane feeders or the metering rotor. Naturally separate motors 6 and 8a can equally be provided and be controlled in electronically coupled manner by the metering controller 10.

In the modified embodiment of the apparatus 1 for continuous gravimetric metering according to Fig. 2, a feed blower for the blow-out line 9 is also provided as a metering device 8 for the metering and further feed, with a construction otherwise similar to Fig. 1. The drive motor of the feed blower (not shown) can also be connected to the metering controller 10, so that the feed rate can be varied, in that the speed of rotation of the feed blower is increased or reduced briefly for example.

Because of the deliberate "backing up" of the bulk material in the constantly filled intermediate container 5, which can also be substantially smaller, in the nature of a compensator or bladder, bulk material is deliberately skimmed off by the rotary-vane feeder 4 and constantly fed back, so that this bulk material serves for self-sealing of the rotary-vane feeder 4 against leakage gas losses.

## CLAIMS

1. A method of continuous metering of bulk material from a container (2) with a rotary-vane feeder (4) and a metering device (8) following the rotary-vane feeder (4), characterized in that the discharge rate of the metering device (8) relative to the feed rate of the preceding rotary-vane feeder (4) is adjusted to a smaller value, so that return feed from the rotary-vane feeder (4) to the container (2) takes place.
2. A method according to claim 1, characterized in that the adjustment or regulation is effected taking into account the filling state of an intermediate container (5) between the rotary-vane feeder (4) and the metering device (8).

A method according to claim 1 or 2, characterized in that the discharge regulation of the metering device (8) is effected by altering the speed of rotation of the metering device (8).

A method according to claim 1 or 2, characterized in that, in the case of pneumatic feed, the discharge regulation of the metering device (8) is effected by altering the air amount and/or the air speed.

Apparatus for continuous metering of bulk material from a container with a rotary-vane feeder and a metering device following the rotary-vane feeder, characterized in that the rotary-vane feeder (4) is coupled to the metering device (8) via a metering controller (10) and the mass flow at the rotary-vane feeder (4) is greater than the discharge rate of the metering device (8) for partial return feed of the bulk material to the container (2).

6. Apparatus according to claim 5, characterized in that the metering device (8) is also formed as a rotary-vane feeder.
7. Apparatus according to claim 5, characterized in that the metering device (8) is formed as a metering rotor scale (8').
8. Apparatus according to claim 5, characterized in that the metering device (8) is formed as a horizontal lock.

- [illegible]

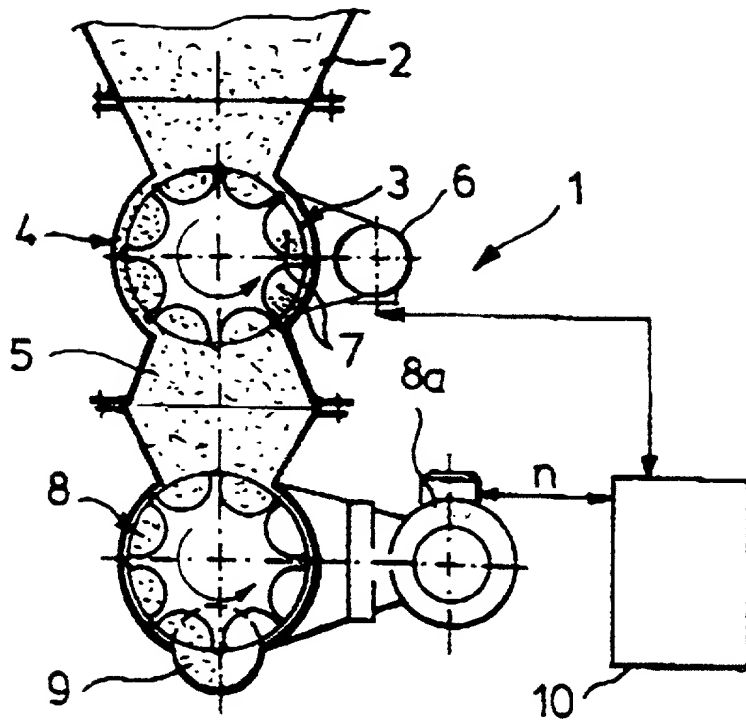


FIG. 1

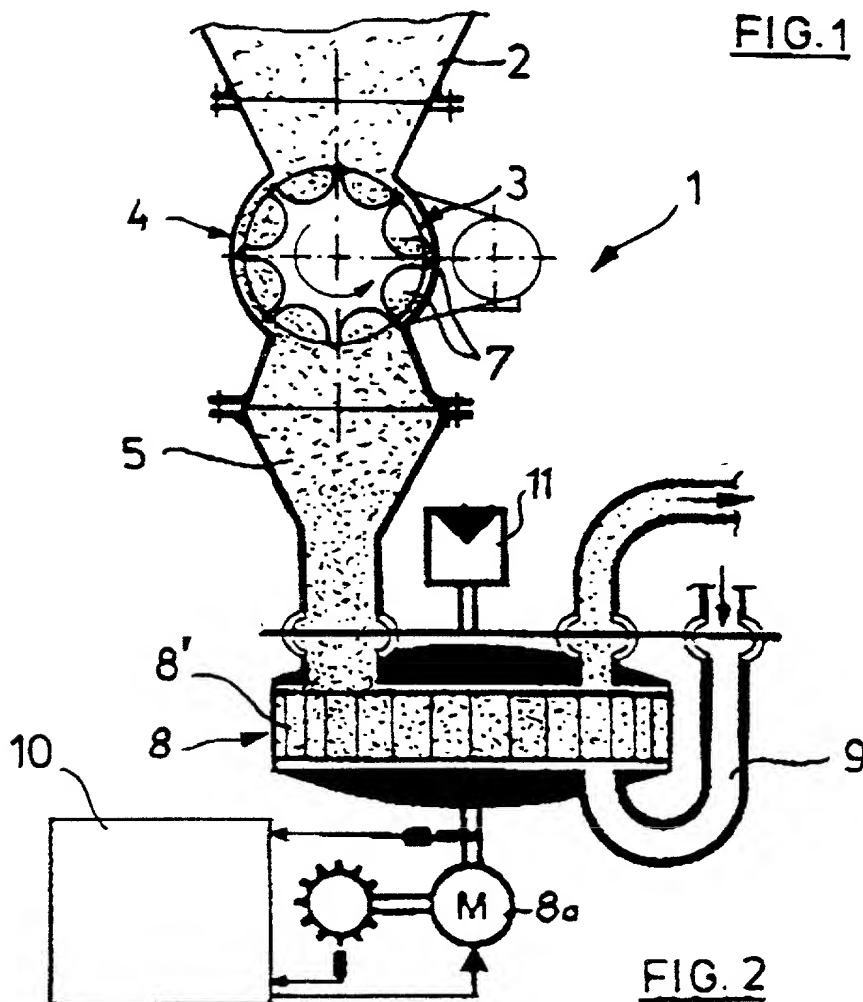


FIG. 2

**DECLARATION AND POWER OF ATTORNEY - USA PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Method and apparatus for continuous metering  
the specification of which:

- (a) ☐ is attached hereto; or
- (b) ☒ was filed on May 10, 2000 as ☐ Serial No. 09/ 544,288  
or ☐ Express Mail No., as Serial No. not yet known \_\_\_\_\_  
and was amended on \_\_\_\_\_ (if applicable); or
- (c) ☒ was described and claimed in PCT International Application No. PCT/EP98/07185 filed on November 11, 1998 and as amended under PCT Article 19 on \_\_\_\_\_ (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56;

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent, design or inventor's certificate or any PCT international application(s) listed below and have also identified below any foreign application(s) for patent, design or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed for the same subject matter having a filing date before that of the application(s) of which priority is claimed:

**PRIOR FOREIGN APPLICATION(S)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 U.S.C. § 119	
Germany	197 49 873.6	11.11.1997	<input checked="" type="checkbox"/> YES	NO <input type="checkbox"/>
			<input type="checkbox"/> YES	NO <input type="checkbox"/>
			<input type="checkbox"/> YES	NO <input type="checkbox"/>
			<input type="checkbox"/> YES	NO <input type="checkbox"/>
			<input type="checkbox"/> YES	NO <input type="checkbox"/>

Residence (city and country): Fichtenweg 15, 86551 Aichach-Walchshofen, Germany DEX

Citizenship: German

Post Office Address: same as residence

Full name of second inventor: \_\_\_\_\_

Inventor's signature \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

Residence (city and country): \_\_\_\_\_

Citizenship: \_\_\_\_\_

Post Office Address: \_\_\_\_\_

Full name of third inventor: \_\_\_\_\_

Inventor's signature \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

Residence (city and country): \_\_\_\_\_

Citizenship: \_\_\_\_\_

Post Office Address: \_\_\_\_\_

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KNOBBE, MARTENS, OLSON & BEAR  
620 Newport Center Drive  
Sixteenth Floor  
Newport Beach, CA 92660-8016

Direct Telephone Calls To:

(714) 760-0404



I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S.A. Application(s)

Serial No.: \_\_\_\_\_ Filing Date: \_\_\_\_\_ Status: \_\_\_\_\_

**POWER OF ATTORNEY:** I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith (if this application is assigned, I acknowledge that the appointed individuals do not represent me, and that instead they represent the assignee): Applicant hereby appoints Louis J. Knobbe, Registration No. 18,780; Don W. Martens, Registration No. 21,107; Gordon H. Olson, Registration No. 20,319; James B. Bear, Registration No. 25,221; Darrell L. Olson, Registration No. 28,247; William B. Bunker, Registration No. 29,365; William H. Nieman, Registration No. 30,201; Lowell Anderson, Registration No. 30,990; Arthur S. Rose, Registration No. 28,038; James F. Lesniak, Registration No. 25,240; Ned A. Israelsen, Registration No. 29,655; Drew S. Hamilton, Registration No. 29,801; Jerry T. Sewell, Registration No. 31,567; John B. Sganga, Jr., Registration No. 31,302; Edward A. Schlatter, Registration No. 32,297; Gerard von Hoffmann, Registration No. 33,043; William C. Rooklidge, Registration No. 31,791; Joseph R. Re, Registration No. 31,291; John M. Carson, Registration No. 34,303; Andrew H. Simpson, Registration No. 31,469; Daniel E. Altman, Registration No. 34,115; Anita M. Kirkpatrick, Registration No. 32,617; Ernest A. Beutler, Registration No. 19,901; Vito A. Canuso, Registration No. 35,471; William H. Shreve, Registration No. 35,678; Stephen C. Jensen, Registration No. 35,556; J. John Shimazaki, Registration No. 37,236; Steven J. Nataupsky, Registration No. 37,688; Michael Fedrick, Registration No. 36,799; Michael H. Trenholm, Registration No. 37,743; AnneMarie Kaiser, Registration No. 37,649; Darryl A. Smith, Registration No. 37,723; Edward J. Treska, Registration No. 37,744; Nancy Ways Vensko, Registration No. 36,298; Jonathan A. Barney, Registration No. 34,292; John R. King, Registration No. 34,362; Richard C. Gilmore, Registration No. 37,335; Bryan C. DeVault, Registration No. 37,304; Stephen S. Korniczky, Registration No. 34,853; Myra H. McCormack, Registration No. 36,602; Raimond J. Salenieks, Registration No. 37,924; Renée E. Canuso, Registration No. 36,657; Guy L. Cumberbatch, Registration No. 36,114; and Michael L. Fuller, Registration No. 36,516.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: HÄFNER Hans Wilhelm

Inventor's signature [Signature] Day 9th Month May Year 2000